

Achievement goals, efficacy beliefs and coping strategies in mathematics: The roles of perceived parent and teacher goal emphases [☆]

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Abstract

This study examines children's perceptions of the achievement goals parents and teachers emphasize for them in mathematics, and the relation of these goals to children's personal achievement goals, self-efficacy beliefs, and coping strategies. Results indicated that children's perceptions of both parent and teacher mastery and performance goal emphases predicted children's personal goals. Further, children's personal goals mediated the relation between perceived parent and teacher goal emphases and children's efficacy beliefs and coping strategies. Children's perceptions of parent and teacher emphasis on performance goals varied slightly by gender but not ethnic background, whereas variance across groups in perceptions of mastery emphases did not reach practical significance. Relations between goal perceptions, personal goals, efficacy and coping strategies also did not vary by gender or ethnic background. Implications for future research regarding the goals children perceive to be emphasized in home and school contexts, and their importance for children's adaptive beliefs and behaviors in mathematics, are discussed.

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1. Introduction

Research regarding children's achievement goals has consistently demonstrated that the achievement goals children adopt are related to a variety of children's academic outcomes, including children's beliefs about their ability to achieve (Middleton, Kaplan, & Midgley, 2004; Roeser, Midgley, & Urdan, 1996), effortful and strategic engagement in learning situations (Dweck & Leggett, 1988; Meece, Blumenfeld, & Hoyle, 1988; Wolters, 2004), and children's responses to challenge and difficulty (Ames & Archer, 1988; Elliott & Dweck, 1988; Turner, Thorpe, & Meyer, 1998). Further, research has yielded evidence that the achievement goals children pursue during classroom activities, as well as the achievement beliefs and behaviors they adopt, reflect to some extent the "goal structure" of the classroom, i.e. the values and goals emphasized by teachers through various classroom practices (Ames, 1992; Kaplan & Midgley, 1999; Nolen, 1988; Urdan, Midgley, & Anderman, 1998). In a similar vein, researchers have examined parents' beliefs and practices as they relate to children's academic outcomes, including parents' expectations and attributions for children's academic outcomes (Eccles-Parsons, Adler, & Kaczala, 1982; Wigfield & Eccles, 1992), involvement in academic activities at school or at home (e.g., Hoover-Dempsey et al., 2001), and emotional support (Hokoda & Fincham, 1995; Wentzel, 1998). However, few studies have considered the relations between achievement goals emphasized by parents and the academic attitudes and behaviors their children espouse. For the present study, we developed instruments to assess children's perceptions of the goals emphasized by parents. We examine simultaneously children's perceptions of the goals parents and teachers emphasize for them, and the relation of perceived goal emphases to children's personal achievement goal orientations, self-efficacy beliefs and children's emotional and behavioral strategies for coping with academic difficulty in mathematics.

1.1. Sociocultural influences on goal orientation

Maehr and his colleagues (Anderman & Maehr, 1994; Kaplan & Maehr, 2002) proposed a model of achievement goal theory in which children's goal orientations are embedded in multiple sociocultural contexts and are a product of prior and current experiences in those contexts. This social-cognitive model stresses the crucial role played by the psychological environments children experience as they engage in academic tasks. See Fig. 1 for a schematic representation of the model.

Although this model does not specify a particular context in which the theory applies, goal theory research in education has primarily examined the psychological environment within specific classroom or school settings. Goal theorists posit that children are sensitive to the emphasis teachers place on different types of achievement goals, as expressed through instructional practice and the ways in which teachers respond to children's accomplishments or shortcomings. For example, research has demonstrated that the nature of classroom tasks (cooperative vs. competitive) and the types of evaluation or recognition strategies (focus on individual improvement vs. ability relative to others) employed by

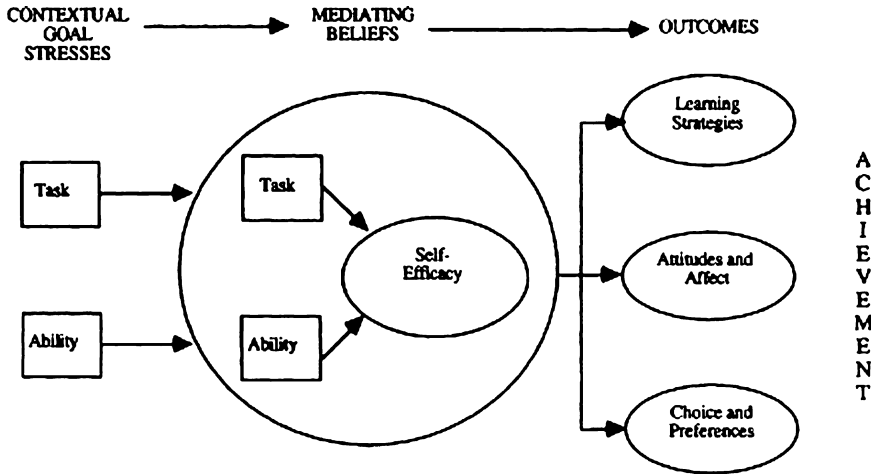


Fig. 1. Schematic representation of goal theory model. Adapted from Anderman and Maehr, 1994.

teachers relate to the achievement goal structure children perceive (Ames, 1992; Epstein, 1988; Patrick, Anderman, Ryan, Edelin, & Midgley, 2001).

The goals teachers emphasize for children have important consequences for children's motivation and achievement. Several lines of research have examined the relation between the goal structure of the classroom context and children's personal goal orientations, ability beliefs, and learning behaviors (Ames, 1992; Anderman & Midgley, 1997; Church, Elliot, & Gable, 2001; Meece, 1991; Middleton et al., 2004; Patrick et al., 2001; Turner et al., 1998). Longitudinal research has further demonstrated that changes in the goals emphasized at the classroom level relate to changes in children's goal orientations and learning behaviors (Anderman, Maehr, & Midgley, 1999; Eccles & Midgley, 1989; Eccles, Midgley, & Adler, 1984).

Much progress has been made toward understanding how the elements of the classroom context relate to children's goal orientations. From an ecological point of view (e.g., Bronfenbrenner, 1979, 1992), however, the school context is only one of the environments in which children's interactions with others might influence their achievement goals, beliefs and behaviors. Contextual cues and interactions with others are interpreted and acted upon in a variety of situations and contexts. Parents in particular are an important source of academic advice, encouragement, and assistance for many children and educational research has lead to the general conclusion that parent involvement in its many and varied forms is an important factor in promoting achievement (e.g., Booth & Dunn, 1996; Henderson, 1987; Henderson & Mapp, 2002).

Several lines of research within the field of achievement motivation have examined how parent variables relate to children's learning behaviors, expectations for success, and achievement outcomes. Parent variables include parenting style (Gonzalez, Holbein, & Quilter, 2002; Grolnick, Ryan, & Deci, 1991), emotional support or encouragement (Hokoda & Fincham, 1995; Wentzel, 1998), and attributions for success and failure or academic expectations (Crandall, Preston, & Rabson, 1960; Eccles-Parsons et al., 1982; Frome & Eccles, 1998; Heyman, Dweck, & Cain, 1992; Kamins & Dweck, 1999) as they relate to children's academic outcomes. Eccles and her colleagues (e.g., Eccles-Parsons et al., 1982)

have found that parents' expectations of elementary and middle school children are predictive of children's expectations as well as their achievement, even after prior achievement is taken into account. These findings were consistent across several subject areas. According to Dweck and her colleagues (Heyman et al., 1992; Kamins & Dweck, 1999) perceptions of parents' and teachers' expectations and attributions for success and failure relate to children's task engagement and persistence, or pursuit of task mastery. These findings mirror those reported in much earlier studies that demonstrated the relevance of parents' reactions to children's performance in achievement situations (Crandall et al., 1960).

Children's experiences of parenting style and emotional support or encouragement offered by parents has been linked to the achievement goals children espouse (Gonzalez et al., 2002; Grolnick et al., 1991; Turner et al., 2002; Wentzel, 1998), as well as children's behaviors during learning tasks (Hokoda & Fincham, 1995). Children who experience high levels of support and encouragement from parents are more likely to espouse mastery goals themselves and tend to demonstrate more persistence and effort during difficult learning tasks (Hokoda & Fincham, 1995). Conversely, children who perceive that parents are disappointed in their performance or not confident in their ability to succeed exhibit helpless or work-avoidant patterns of behavior (Heyman et al., 1992; Hokoda & Fincham, 1995).

These studies contribute to our understanding of how parents' expectations and support may influence children's goals, learning behaviors, and achievement outcomes. However, they do not directly examine the achievement goals children perceive in the family context or how such goals relate to children's academic outcomes. Whereas considerable research has been conducted regarding the role of achievement goals stressed in instructional or classroom contexts, considerably less is known about the role that parents' goals for their children play in children's pursuit mastery or performance goals in school, their efficacy for engaging in academic tasks, or the behaviors they employ to cope with difficult tasks. Further, it is not clear whether the goals parents emphasize relate to children's personal goals, efficacy, or learning behaviors when the goals teachers emphasize in the classroom are taken into account.

Studies which assess sources of motivation in the classroom context, including the goal structures teachers impose, tend to ignore children's experiences at home. Similarly, the vast majority of studies that examine the relation between family context or parenting behaviors and children's academic outcomes do not assess motivational elements of the classroom environment, which are important sources of motivation for many children. By asking children to identify their parents' goals in addition to the goals they perceive in the classroom context, the current study provides an important link between two lines of research and furthers our understanding of contextual factors that relate to children's achievement goals, efficacy beliefs, and coping behaviors.

1.2. Achievement goal theory

Achievement goals have been described as cognitive representations of both children's reasons for engaging in academic tasks and the standards that will be used to judge or evaluate their performance (Maehr, 1984; Pintrich, 2000). Research suggests that different goals may be pursued simultaneously, and that people may orient themselves towards different goals in different subject areas or skill domains (Anderman & Midgley, 1997; Bong, 2001; Pintrich, 2000). For example, a child may engage in a task in order to develop ability or understanding, judging performance in terms of improvement over time or

progress towards an absolute standard. This reflects a “task” or “mastery” orientation. Children may also strive to demonstrate their ability at a task or the ease with which they can do a task, often focusing on performance relative to others as a measure of success. This has been termed an “ability” or “performance” orientation.

A mastery goal orientation has consistently been associated with adaptive academic beliefs and behaviors, including greater persistence and effort during challenging tasks, increased use of deep level cognitive processing strategies, greater academic self-efficacy, and attribution of success in school to effort rather than ability (Ames, 1992; Dweck & Leggett, 1988; Pintrich, 2000; Urdan, 1997, for reviews). In contrast, research regarding the academic beliefs and behaviors associated with a performance goal orientation has yielded less consistent findings. This may be due in part to the distinction researchers often, but not always, make between approach and avoidant performance orientations, which separate a person’s desire to perform better than others or appear competent from their desire to *avoid* performing worse or appearing *incompetent*. Items assessing these orientations have at times been combined into a single scale, making it difficult to interpret some research findings with respect to one type of performance orientation or the other. In general, adoption of an approach orientation is considered to be more adaptive than an avoidant orientation, particularly with respect to achievement. However, adoption of a performance-approach orientation has also been related to less adaptive outcomes, including children’s avoidance of academic challenge, their use of self-handicapping strategies, and increased negative affect following failure or difficulty (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001; Urdan, 1997 for reviews). In the present study, we utilize an approach-oriented measure of children’s personal performance goal orientation, and combine approach and avoid items in our assessment of children’s perceptions of parent and teacher performance emphasis. This is described further below.

We were particularly interested in the relation of the goal emphases children perceive at home and in math class to the personal goals, self-efficacy beliefs, strategies children employ to cope with academic difficulty in mathematics (both learning-related and affective coping strategies). These outcomes represent important indicators of children’s academic well-being, and fit well with the model (Fig. 1) proposed by Maehr and his colleagues (Anderman & Maehr, 1994; Kaplan & Maehr, 2002).

1.2.1. Academic self-efficacy beliefs

Academic self-efficacy refers to children’s confidence in their ability to master new skills and tasks, often in a specific academic domain such as mathematics (Midgley et al., 1998; Pajares & Miller, 1994; Schunk, 1989). Self-efficacy differs from perceived ability or competence (“I am good at math”), in that it is a measure of children’s *anticipated* success given their current capabilities (“I can master the skills in math this year if I try”). It has been related to higher levels of learning, persistence, effort and achievement, (Schunk, 1996, 1989), even after accounting for previous achievement and cognitive skills.

Mastery goals consistently have been related to academic self-efficacy (Kaplan & Midgley, 1999; Middleton & Midgley, 1997; Midgley & Urdan, 1995; Roeser et al., 1996; Schunk, 1996), whereas the relation between performance goals and self-efficacy has been less consistent. Some studies have found performance goals to be negatively associated with self-efficacy (Schunk, 1996) and others have found a positive relation (Wolters, Yu, & Pintrich, 1996).

In the present study, we examine self-efficacy as an outcome variable that in many ways serves as an indicator of academic well-being. Although it is presented as a mediating variable in Fig. 1, we do not treat it as such due to the cross-sectional nature of our data.

1.2.2. Coping with negative academic experiences

Coping has been described as the cognitive and behavioral strategies children employ to alleviate negative emotions that often arise from a stressful event, such as doing poorly on a test or failing to complete a task (Folkman & Lazarus, 1988; Kamins & Dweck, 1999; Lazarus, 1993). In literature on academic achievement motivation, persistence at difficult tasks and academic self-regulation (reviewing material and correcting mistakes, for example) would be considered “positive” or adaptive coping strategies, because they increase learning and improve a child’s chances of doing better at the task in subsequent attempts. Conversely, maladaptive coping strategies might include ignoring or denying a negative event (such as doing poorly on a test), blaming others for a personal failure, or downplaying the relevance of the event for future success (Kaplan & Midgley, 1999; Tero & Connell, 1984). Such strategies may serve to direct attention away from a child’s perceived lack of ability, protecting a child’s sense of self-worth (Covington, 1992). However, such behaviors also decrease the likelihood that a child will attempt to correct mistakes or improve his or her skills. In addition to more traditional coping behaviors, Tero and Connell (1984) identify “non-coping” behaviors and thoughts that amplify anxiety, such as feeling stupid or worrying about what other people will think.

Prior research has suggested a relation between the achievement goals children adopt and their responses to academic difficulty or failure. Mastery goals have been related to positive cognitive, affective, and behavioral outcomes for both low- and high-achieving children, facilitating persistence and positive self-beliefs even following failure. However performance goals, which focus on outcomes as a reflection of relative ability, have been related to helplessness, withdrawal of effort, and negative self-appraisals or affect following difficulty or failure (Butler, 1993; Dweck & Leggett, 1988; Elliott & Dweck, 1988; Jagacinski & Nicholls, 1987; Kaplan & Midgley, 1999; Turner et al., 1998).

In the present study, we utilize measures of behavioral and affective coping strategies to represent two of the three “outcome” variables in the model presented in Fig. 1. The measures we selected capture adaptive as well as protective (and in some cases maladaptive) learning strategies and affective responses to difficulty in mathematics.

1.3. Group level differences in goal orientation and related outcomes

There is strong empirical evidence that children’s goal orientations are influenced by societal norms with respect to gender. In a majority of studies, boys reported greater support for performance goals than did girls, whereas girls were more likely than boys to endorse mastery goals (Middleton & Midgley, 1997; Roeser et al., 1996; Ryan, Hicks, & Midgley, 1997). Research also suggests that, in some subjects (e.g., mathematics), parents hold different expectations for boys and girls (Jacobs, 1991) and that parents and teachers make different attributions for boys’ (ability) and girls’ (effort) successes and failures (Eccles-Parsons et al., 1982; Yee & Eccles, 1988). Taken together, these findings lead us to believe that parents and teachers may emphasize different achievement goals for boys and girls. We hypothesize that boys perceive a greater emphasis on performance goals, i.e., on

demonstrating ability, in mathematics than do girls, and that girls perceive a greater emphasis on mastery goals than do boys from both parents and teachers.

Empirical findings also suggest differences in goal orientation related to ethnic background. Middleton and Midgley (1997) found that African American girls endorsed mastery goals more strongly than girls from families of European descent. Other studies have noted ethnic differences with regard to parents' academic values and beliefs about learning, as well as attributions for success and failure (e.g., Hamilton, Blumenfeld, Akoh, & Miura, 1989; Holloway, 1988). However, we know of no previous study that has examined ethnic differences with respect to the achievement goals children perceive within the family context. Thus, one of the aims of the present study is to examine the variability among children's perceptions of parents' emphasis on mastery and performance-approach goals, and assess whether children's perceptions vary according to children's gender and ethnic background.

Academic self-efficacy has also been shown to vary with respect to personal characteristics including gender and ethnicity. Regarding gender, several researchers have found that girls exhibit lower academic self-efficacy than boys, particularly in mathematics, a finding consistent for children from diverse ethnic backgrounds (Middleton, 1999; Middleton & Midgley, 1997; Edelin & Paris, 1995). Ethnic differences in academic self-efficacy have also been found. Several researchers have documented that African American children tend to report more confidence in their ability to achieve academically than European American children, even after accounting for variance among children in actual academic achievement (Lay & Wakstein, 1985; Stevenson, Chen, & Uttal, 1990).

1.4. Summary and hypotheses

The first question we addressed in this study was whether parents as well as teachers could be characterized by children as emphasizing specific achievement goals, and if so, whether children distinguish between the goals parents emphasize for them and those that teachers emphasize. We hypothesized that they are capable of making such a distinction, particularly since parents and teachers may have very different ways of interacting with children and may prioritize different goals. In addition, we expected that children's personal goal orientations would be uniquely related to the goals they perceived to be emphasized by both parents and teachers. We did not assume that one source would be a stronger predictor of personal goal orientation than the other, as emphasis may vary across teachers or parents (for example, some parents or teachers may have stronger beliefs than others regarding how children approach learning and achievement in the specific domain of mathematics).

We further hypothesized that the effects of perceived goal emphases on children's efficacy beliefs and coping strategies in mathematics would be indirect, mediated by the personal goals children adopt for that subject area, as depicted in the model proposed by Maehr and colleagues (see Fig. 1). In accord with Bronfenbrenner's ecological model, we assume that children act as interpreters of their environment, actively constructing meaning from the interactions they have with parents and teachers. It is in this way that parents and teachers influence the goals children adopt, which then affect how children perceive and evaluate their abilities (e.g., efficacy beliefs) and respond to information about their performance (e.g., coping strategies).

Finally, we explored the ways in which boys and girls, and children with different ethnic backgrounds, differed with respect to their perceptions of goals emphasized within classroom and family contexts. We expected girls and boys to differ in their perceptions of mastery and performance goals conveyed by parents and teachers. We explored differences in goal perceptions by ethnic background as well, although we made no specific hypotheses. We anticipated differences in efficacy and use of coping strategies by gender and ethnicity due to variability in the goals children pursue, but did not expect the relations between variables to change when gender and ethnic background are taken into account.

2. Method

2.1. Participants

This study was a part of a larger longitudinal study that focused on the relation between the learning environment in mathematics classrooms and children's beliefs and behaviors in mathematics during the transition from elementary to middle school (Turner et al., 2002). Data for the present study were collected when children were in seventh grade, their first year of middle school. Participants were from four ethnically and economically diverse school districts in three Midwestern states. Parental permission was required for participation, and 86% of eligible children received permission in their sixth grade year.

Of the children who received permission to participate, 80% remained in the sample after the transition to middle school. The present study utilizes data from 1021 children. Girls comprised 52% of the children who participated during this wave, and the majority were Caucasian (65%) or Black (26%). A small number of Hispanic children (4%) were present in the sample as well. In school districts in which data were available regarding children's economic background (two out of the four districts), 36% of participating children qualified for free or reduced price school lunch. Given regional demographic similarities, we have reason to assume a similar economic balance in the remaining two districts.

2.2. Survey administration

Trained research assistants administered surveys to children during math class. A research assistant read each item aloud while children followed along and responded. The survey took approximately 45 min to administer. Prior to survey administration, the research assistants told children that the survey was about the reasons they do their math work, and how they feel about their math class. Sample items were presented and discussed to acclimate children to the use of numeric scales to respond to items on the survey. Children were encouraged to ask questions about items they did not understand. Children were informed that the information they provided would be confidential, and surveys were removed from the school building immediately following administration.

2.3. Measures

Each child completed a survey consisting of 145 items, which represented 26 different constructs. Eleven constructs were utilized for the present study, including children's personal mastery and performance-approach goals in mathematics and their perceptions of the goals their math teacher emphasized in the classroom, as well as children's perceptions

of their parents' goals for them in math. In addition, we utilized scales assessing children's self-efficacy and use of positive, denial, projective, and non-coping strategies in mathematics. Children answered each item on a 5-point Likert-type response scale, anchored with "not at all true" = 1, "somewhat true" = 3, and "very true" = 5. Therefore, a high score indicated endorsement of the construct.

2.3.1. Perceived parent goal emphases

We developed survey items assessing children's perceptions of parent mastery and performance goal emphases for the present study, based in part on items used in an earlier study (Hruda & Midgley, 1997). We worded the items to reflect children's perceptions of what parents would like them to do, or to avoid doing, and selected achievement behaviors that are typically used to assess children's personal goal orientations, such as learning from mistakes or striving to outperform others. With one exception, the items do not assess children's perceptions of specific behaviors or words parents employ to emphasize goals, but rely on children's interpretation of their interactions with parents as they reinforce children's mastery- or performance-oriented behaviors and values. A total of 16 items were tested, including nine mastery-oriented items and seven performance-oriented items.

The final scale assessing perceptions of parent mastery emphasis included six items that asked children whether their parents wanted them to understand or think about math concepts, attempt challenging problems, learn from mistakes, and work hard in math. The final scale assessing perceptions of parent performance emphasis included five items (three approach-oriented items, one focused neutrally on relative ability, and one avoid-oriented). These asked whether parents would be pleased if the child could demonstrate superior ability compared with others, could show that math was easy for them, whether parents disliked mistakes, and whether they are concerned with the child's performance relative to others.

2.3.2. Perceived teacher goal emphases

Items assessing children's perceptions of their math teacher's emphasis on mastery and performance goals (or "goal structure") in the classroom were adapted from the Patterns of Adaptive Learning Survey (PALS; Midgley et al., 1997). These scales have been developed over the course of several years, and reliability and validity have been documented in several studies involving young adolescents (Anderman & Anderman, 1999; Kaplan, Gheen, & Midgley, 2002; Midgley et al., 1998; Patrick et al., 2001). Items in the mastery goal emphasis scale (six items) assessed perceptions of the teacher's emphasis on understanding and exploring math concepts, finding new ways to solve math problems, rewarding effort, and learning from mistakes. Items measuring perceptions of the teacher's emphasis on performance goals (five items; two approach-oriented, two avoid-oriented, and one neutral item) assessed whether the teacher calls attention to children who receive the highest grades and test scores, tells the class who is doing well or poorly in math, and provides children with information about how they do compared to other children.

2.3.3. Personal goal orientations

These items were also adapted from PALS (Midgley et al., 1997). Items in the mastery goal orientation scale assessed whether children felt it was important to understand math, learn as much math as possible, and improve their math skills (5 items). Items reflecting personal performance goal orientation assessed whether a child's goals included looking

smart in math compared to others, showing others that she is good at doing math, and demonstrating that math is easy for her (5 items). These items were designed to capture performance-approach goal orientation (striving to appear able) rather than performance-avoid goal orientation (striving to avoid looking unable).

2.3.4. *Academic self-efficacy in mathematics*

Children responded to math-specific items assessing their academic self-efficacy. These items measured the extent to which a child anticipated that he or she could master the skills taught in math and do the work in math class. This five-item scale was also developed as part of PALS (Midgley et al., 1997).

2.3.5. *Coping strategies*

The coping strategies were measured using the Academic Coping Inventory (ACI), a self-report measure developed by Tero and Connell (1984). This inventory includes four scales assessing positive, projective, denial, and non-coping strategies. All items begin with the stem, “When something bad happens to me in math,” and include examples, “such as not doing well on a test, or not being able to answer a question in class.”

Positive coping items measured children’s use of adaptive strategies following a bad experience in math, including figuring out what they did wrong and aspiring to do better next time. Items on the remaining three scales reflect less adaptive thoughts, feelings, and behaviors that children may have when they experience difficulty in school. Projective coping items rated the extent to which children placed blame for their difficulties in math on the teacher or the “unfair” nature of a test. Denial coping items captured whether children thought they would downplay the importance of a negative event, or say they didn’t care about it. Non-coping items assessed whether children would make negative self-appraisals or worry that others would do so.

2.4. *Analytic method*

Factor analytic techniques were employed to establish children’s ability to distinguish between goals emphasized by parents and teachers, and to verify that perceptions were distinct from children’s report of personal goal orientations. We then tested for group-level mean differences in children’s perceptions of the goals emphasized by parents and teachers, and also in children’s personal goal orientations, efficacy beliefs, and coping strategies employed in mathematics.

To examine the relations between children’s perceptions of goal orientations emphasized in their classroom and family contexts and their own goals, beliefs and coping strategies we tested the theoretical model specified above using maximum likelihood estimates in the structural equation model framework with latent variables. In order to create indicator variables for the structural equations analysis with latent variables, subscales were created by random item assignment (parceling). Creation of subscales in this way has also been shown to be beneficial for model stability fit as long as the original items measure a common construct (Bandalos & Finney, 2001; Little, Cunningham, Shahar, & Widaman, 2002). A tau-equivalent measurement model was adopted for the resulting subscales, i.e. the indicator variances were assumed to be identical for indicators of the same construct (McDonald, 1999). This is justified because random assignment of items to subscales minimizes differences in error variances. For constructs with only three items, each item was utilized as an

indicator variable. Residual variances were not allowed to correlate. We utilized LISREL (version 8.3.5, Jöreskog & Sörbom, 2002) to test the overall fit of the model. Model adjustments were only considered for the direct effects between parents and teachers' goal orientations and child outcome variables. The theoretical model predicts that these effects are negligible if the indirect effects (mediated through children goal orientation) are controlled for. The final model was also tested for structural differences by gender and ethnicity.

3. Results

3.1. Factor analyses

Since the items assessing perceived parents' goals were new, we conducted exploratory factor analysis with half the sample (random selection) to determine whether items assessing children's personal goal orientations and their perceptions of parents' and teachers' emphasis on mastery and performance goals would form separate scales, reflecting children's ability to distinguish between personal and perceived parent and teacher goal emphasis. Initially, several items cross-loaded or formed separate factors and were removed. Items assessing performance-approach and performance-avoid orientations (personal and perceived) formed three factors (personal, perceived parent, and perceived teacher) but did not form distinct approach and avoid factors. To simplify analyses, we opted to use only personal approach items, but chose to retain some avoid items for constructs assessing perceptions of parent and teacher performance goal emphases, as dropping avoid-oriented items caused constructs to become unreliable.

Confirmatory analysis with the remaining half of the sample verified the final factor structure, in which the six separate constructs were identified (personal mastery and performance goal orientations, perceived teacher and parent mastery and performance goal emphases). Factor loadings for the sample as a whole appear in the Appendix A. Internal consistency for the scales used in the present study was acceptable. Cronbach's alpha for the scales described above (goal orientation scales as well as efficacy and coping scales) ranged from .65 (perceived parent mastery emphasis) to .86 and were comparable to reliability statistics reported in prior research (e.g., Kaplan & Midgley, 1999; Midgley et al., 1998; Midgley et al., 1997). A complete list of constructs (including items and internal consistency) appears in the Appendix A.

3.2. Mean differences

Table 1 shows the mean scores and standard deviation for all variables by gender and ethnicity. Several significant differences were found with respect to children's perceptions of goal orientations emphasized by parents and teachers, although effect sizes were generally small (eta squared for findings significant at $p \leq .01$ range from .01 to .03). On average, boys perceived a slightly greater emphasis from parents than did girls on performance goals. Boys also endorsed personal performance goals more strongly. No differences were found between boys' and girls' perceptions of mastery goals either at home or in the classroom, or with respect to personal mastery goal orientation.

Black and Caucasian children differed slightly in their perceptions of mastery goals emphasized by the teacher and with respect to their personal mastery goal orientations, with Black children perceiving and endorsing mastery goals more strongly than Caucasian

Table 1
Mean differences by gender and ethnicity

	Girls mean (<i>SD</i>)	Boys mean (<i>SD</i>)	<i>F</i>	η^2	Caucasian mean (<i>SD</i>)	Black mean (<i>SD</i>)	Hispanic mean (<i>SD</i>)	<i>F</i>	η^2
Perceived parent mastery emphasis	3.89 (.68)	3.84 (.69)	1.60	.002	3.88 (.74)	3.87 (.72)	3.82 (.66)	.16	.000
Perceived parent performance emphasis	2.22 (.84)	2.52 (.82)	34.33***	.032	2.34 (.85)	2.36 (.85)	2.59 (.94)	1.55	.003
Perceived teacher mastery emphasis	3.88 (.80)	3.84 (.79)	.58*	.001	3.80 ^a (.77)	4.00 ^a (.77)	3.89 (.65)	6.14**	.012
Perceived teacher perform emphasis (1.06)	2.18 (1.04)	2.33	5.72	.006	2.29(1.07)	2.23(1.06)	1.99 (.93)	1.61	.003
Personal mastery orientation	4.36 (.75)	4.30 (.80)	1.31	.001	4.27 ^a (.82)	4.50 ^a (.65)	4.34 (.68)	8.88***	.018
Personal performance orientation	2.09 (.93)	2.47 (1.07)	38.43***	.036	2.27 (1.00)	2.23 (1.02)	2.42 (.99)	.59	.001
Self-efficacy	3.96 (.82)	4.09 (.78)	7.19**	.007	4.00 (.82)	4.09 (.77)	4.02 (.67)	1.11	.002
Positive coping	3.96 (.96)	3.83 (.94)	4.55*	.004	3.87 (.95)	4.02 (.95)	3.76 (.92)	3.12*	.006
Projective coping	1.51 (.72)	1.68 (.93)	10.50***	.010	1.60 (.82)	1.62 (.87)	1.58 (.68)	.10	.000
Denial coping	2.14 (.95)	2.22 (.99)	1.66	.002	2.26 ^a (.99)	2.00 ^a (.96)	2.20 (.78)	6.55***	.013
Non-coping	2.17 (1.03)	1.99 (.92)	8.89**	.009	2.09 (.97)	1.98 (.96)	2.26 (1.03)	2.05	.004

^a Groups significantly different.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

children. However, perceptions of *parent* mastery emphasis did not differ by ethnic background. No ethnic differences emerged in perceptions of performance goals emphasized either at home or in the classroom, or with respect to personal performance-approach orientation. No significant differences were found between Hispanic children and other groups, although this may be due to their relatively small representation in the sample.

With respect to efficacy and coping outcomes, boys were slightly more likely to engage in projective coping strategies than were girls, and Black children were less likely than Caucasian children to utilize denial strategies. Interestingly, we found no differences in children's academic self-efficacy beliefs in mathematics across ethnic groups, and only small and practically insignificant differences by gender. See [Table 1](#).

3.3. Correlations

Correlations appear in [Table 2](#). Bivariate correlations appear below the diagonal, whereas correlations among the SEM latent variables (accounting for measurement error) appear above the diagonal. Scales assessing personal mastery goal orientation and perceived parent and teacher mastery goal emphases were significantly correlated, with bivariate coefficients ranging from .36 to .40 (p .001) and latent variable correlation coefficients from .50 to .59. Performance goal scales were also significantly correlated, with bivariate coefficients ranging from .20 to .55 (p .001) and latent variable correlation coefficients from .24 to .70. Of note, correlations (bivariate as well as latent) suggested that children's personal goal orientations were more strongly related to their perceptions of parents' goal emphases than to the goals children perceived to be emphasized by teachers.

Children's perceptions of parents' mastery goal emphases were significantly correlated with all child outcomes except non-coping, and with their perceptions of teacher mastery emphasis. As expected, perceptions of parent mastery emphases related positively to personal mastery goal orientation, self-efficacy, and use of positive coping strategies, and negatively to children's use of projective and denial coping strategies. Perceptions of teacher mastery emphasis were negatively correlated with teacher performance emphasis, but otherwise show a similar relation to child outcomes as do perceptions of parent mastery emphasis.

Perceived parent performance goal emphases were positively related to children's personal performance-approach goals, perceived teacher performance emphasis, as well as projective and non-coping strategy use, but unrelated to children's sense of efficacy and their use of positive and denial coping strategies. Perceptions of teacher performance goal emphases were more consistently related to both adaptive and protective or maladaptive coping strategies than were perceptions of parent performance goal emphases (see [Table 2](#)). Perceptions of teacher performance emphasis were negatively related to positive coping strategies, and positively related to protective or maladaptive strategies.

3.4. Structural equation model

To examine the relations between children's perceptions of goals emphasized in their classroom and family contexts and their personal goals, efficacy beliefs and coping strategies we developed and tested a theoretical model (see [Fig. 1](#)). In the first step of the analysis, we tested the full mediation model (Model 1, [Table 3](#)) containing only indirect paths between

Table 2
Bivariate and latent variable correlations

Scale	Correlations										
	1	2	3	4	5	6	7	8	9	10	11
1. Perceived parent mastery	—	.02	.58	−.07	.59	.06	.37	.41	−.19	−.28	.05
2. Perceived parent performance	.02	—	−.02	.34	.07	.70	.05	−.02	.24	.05	.30
3. Perceived teacher mastery	.40***	.00	—	−.32	.50	.05	.31	.35	−.22	−.24	.04
4. Perceived teacher performance	−.05	.28***	−.24***	—	−.13	.24	−.08	−.11	.34	.09	.09
5. Personal mastery	.40***	.07	.36***	−.10	—	.09	.63	.70	−.33	−.48	.07
6. Personal performance	.06	.55***	.06	.20***	.09	—	.07	−.03	.29	.08	.42
7. Self-efficacy	.33***	.02	.29***	−.09	.52***	.08	—	.55	−.28	−.29	−.12
8. Positive coping	.40***	−.03	.35***	−.15***	.53***	−.01	.45***	—	−.44	−.48	.05
9. Projective coping	−.15***	.24***	−.26***	.32***	−.26***	.21***	−.25***	−.36***	—	.51	.29
10. Denial coping	−.13***	.05	−.13***	.12***	−.37***	.05	−.22***	−.34***	.40***	—	−.02
11. Non-coping	.02	.34***	−.01	.18***	.04	.38***	−.13***	.00	.29***	.00	—

Note. Listwise $N = 1028$ lower diagonal/ $N = 1004$ upper diagonal.

*** $p < .001$.

Table 3

Fit indices for tested models and model comparison tests

Model	Specifications	χ^2	df	p	RMSEA	TLI
1	Full mediation model	721.80	271	.000	.041	.97
2	Final model (including one direct effect)	671.72	270	.000	.039	.97
3a	Two group gender model (coefficients invariant across groups)	1139.32	621	.000	.041	.97
3b	Two group gender model (all coefficients allowed to vary across groups)	987.98	540	.000	.041	.97
3c	Two group gender model (coefficients invariant except structural paths)	1118.27	602	.000	.041	.97
4a	Three group ethnicity model (coefficients invariant across groups)	1682.21	972	.000	.043	.96
4b	Three group ethnicity model (all coefficients allowed to vary across groups)	1417.89	810	.000	.045	.96
4c	Three group ethnicity model (coefficients invariant except for structural paths)	1647.31	934	.000	.044	.96
Difference testing		χ^2 Diff	df	p		
1 vs. 2	Improvement by adding direct path?	50.08	1	.000		
3a vs. 3b	Gender differences in entire model	151.34	81	.050		
3a vs. 3c	Gender differences in structural paths	21.05	19	.334		
4a vs. 4b	Ethnic differences in entire model	264.32	162	.000		
4a vs. 4c	Ethnic differences in structural paths	34.9	42	.773		

perceptions of parent and teacher goal orientations and child outcomes. This theoretical model was well supported by the data, given a root mean square error of approximation (RMSEA) of .04 and a Tucker–Lewis fit index (TLI) of .97. However, from the inferential standpoint, the χ^2 statistic of 721.80 with 271 degrees of freedom was highly significant and justified the inspection of the modifications indices (Lagrange multipliers) for path coefficients fixed to zero. In addition, standardized residuals suggested that the model overall misfit was not scattered across the correlation matrix but would gain strength by allowing specific additional paths (for a discussion, see McDonald & Ho, 2002). With a potential χ^2 reduction of 50.08 the direct path from perceived teacher’s performance orientation to children’s projective coping was particularly unlikely to be negligible in the population. After inspection of the item wordings, some of which focused on projecting blame onto the teacher, we decided to include this direct path in our final model estimate (Model 2 in Table 3). As expected, including this direct path significantly improved the model fit (see lower panel in Table 3; difference testing Model 1 vs. 2). We refrained from allowing additional direct effects as they would have only marginally improved the fit and at the same time weakened the parsimony of the model. Note that the final model retained all coefficients of the indirect effects even if they were insignificant in order to avoid model overfitting. Fig. 2 depicts the structural part of the model including standardized regression coefficients and explained variances. To keep the figure legible, the measurement part was omitted.

3.4.1. Parents and teachers’ goal orientations

Our final structural equation model indicated that children’s perceptions of teacher and parent goal orientations are correlated but not redundant as predictors of children’s goal orientations. Children’s performance-approach orientation was strongly predicted by perceived parental performance emphasis (.70), but was not significantly predicted by perceived teacher performance emphasis. Likewise, the strongest predictor of child’s

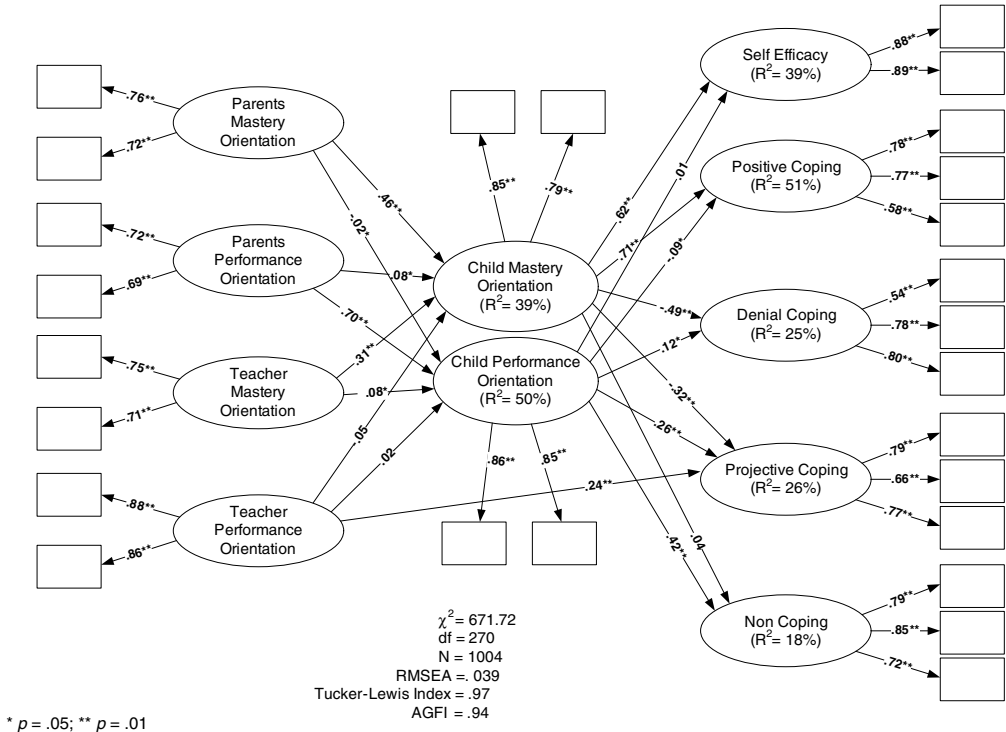


Fig. 2. Final model parameter estimates (standardized) and explained variances ($N = 1004$).

mastery orientation was perceived parent mastery emphases (.46) with teacher's mastery orientation as a slightly weaker predictor (.31). In addition, although teachers' emphasis on performance was less important in the prediction of children's goal orientation, this emphasis was directly linked to children's tendencies to employ projective coping strategies. Overall, the model explained 50% of the variance in children's performance orientation and 39% of children's mastery orientation.

3.4.2. Personal goal orientations and achievement-related outcomes

The model parameters suggest that academic self-efficacy beliefs are best predicted by children's mastery orientation (.62). Positive coping strategies are also substantially predicted by children mastery orientation (.71) and weakly but negatively related to personal performance goals (−.09). Projective coping is positively predicted by children's performance-approach orientation (.26) and teachers' performance emphasis (.24) and negatively by children's mastery orientation (−.32). Denial as a coping style is weakly associated with children's performance-approach orientation (.12) but strongly and negatively related to the endorsement of personal mastery goals (−.49). Non-coping on the other hand is best predicted by children's performance-approach orientation (.42).

Model 2, which included all indirect effects and one additional direct effect, explains 39% of the variance in children's academic self efficacy, and 51% of the variance in their use of positive coping strategies. Denial and projective coping strategy use are explained to

25% and 26% respectively, and the model accounts for 18% of the variance in children's endorsement of non-coping behaviors.

3.4.3. Gender and ethnic differences

In order to test the generalizability of the final model to subpopulations represented in our sample, we ran multi-group models for gender and ethnicity. Model 3a in Table 3 provides the test statistics for a two-group LISREL model that analyzes the covariance matrices of boys and girls separately with the restriction that all model parameters are invariant. Model 3b tested the same underlying model for both groups but allowed for different coefficients in both groups. The χ^2 difference test between the two models is highly significant ($\chi^2 = 151$, $df = 81$, $p = .000$; see Table 3, difference test Model 3a vs. 3b), indicating that some of the parameters differ substantially by gender. We further investigated whether these gender differences are associated with relevant model parameters (i.e. structural coefficients) or the measurement component of the model. In Model 3c, all but the structural coefficients (direct and indirect effects) were set invariant for both groups. The χ^2 difference test of Model 3c against Model 3a tested whether the model fit significantly improves if the structural coefficients are allowed to vary across both gender groups. This is not the case as the test is insignificant ($\chi^2 = 21.05$, $df = 19$, $p = .334$). We concluded that the gender differences are mainly due to differences in error variances; girls tend to answer the survey items slightly more reliably than boys.

Similarly, Models 4a, 4b, and 4c test sequentially the structural differences between three ethnic groups (Caucasian, Hispanic, and Black). Again, the comparison between the completely constrained model (Model 4a) and the model with group-specific parameter estimates renders a significant χ^2 difference test. However, as the insignificant χ^2 difference test of Model 4c against Model 4a reveals ($\chi^2 = 34.90$, $df = 42$, $p = .773$), the ethnic differences reflect difference in the measurement properties of the model rather than substantial differences in the structural coefficients given in Fig. 2.

In sum, we found general support for our hypothesis that children's personal goals mediate the relation between the goals they perceive parents and teachers to emphasize and their efficacy and coping strategies in mathematics. We allowed one direct path between perceived teacher performance goal emphasis and projective coping strategies. Regarding group level differences, the structural relations depicted in Fig. 2 are the same for boys and girls and for children with different ethnic backgrounds.

4. Discussion

In the present study, we assessed children's perceptions of the goals emphasized in both home and classroom contexts and examined the relation of such goals to children's personal achievement goal orientations, self-efficacy beliefs and strategies for coping with academic difficulty in mathematics. We theorized that children are sensitive to the specific and potentially different achievement goals emphasized by adults at home and at school. Our results suggested that children in our seventh grade sample were able to differentiate between the goals that teachers and parents emphasize, and that children's perceptions of these goals have unique relations to the goal orientations children themselves espouse.

Our analysis of the final structural equation model indicated that children's perceptions of both parents and teachers contribute to the goals children choose to

pursue, consistent with the model proposed by Maehr and his colleagues (Fig. 1). Whereas children's mastery orientation was predicted by their perceptions of both parent and teacher emphasis on mastery goals, performance-approach orientation was largely predicted by children's perceptions of parents' emphasis on performance goals.

Interestingly, we observed that while perceptions of both contexts contributed to the goals children espouse, children's personal goals were more strongly related to those they perceived to be emphasized by parents than by teachers, particularly with respect to performance goals. Other research has in general noted stronger relations between the goal structure of the classroom and children's personal goals, but has not taken children's perceptions of the family context into account.

Consistent with prior research utilizing PALS assessment protocols (Midgley et al., 1997), we assessed children's perceptions of specific observable teacher behaviors. We then assumed that children perceived these behaviors as we do (e.g., Patrick, Anderman, & Ryan, 2002), to be indicative of certain preferences or goals the teacher would like them to adopt. We assessed children's perceptions of parent goal emphases differently, primarily due to the paucity of qualitative research regarding the behaviors parents enact that convey an emphasis on specific goals. In this case, we assessed children's inferences about what their parents seemed to value, or what they should do that would please their parents. We feel that this is a more direct way to assess children's perceptions of the achievement goals emphasized by parents. However, the language of the new items is in fact more parallel to that used in items assessing personal goal orientation, which may have influenced the strength of the relation between children's perceptions of parents and their personal goal orientations. We recommend that new items be developed for assessing perceived teacher goal emphases that parallel those we developed to assess perceptions of parents' goal emphases, in addition to qualitative research exploring children's interpretation of specific parent and teacher behavior believed by researchers to convey and emphasis on mastery or performance goals.

The strong relation between children's personal goals and those they perceive at home is not surprising, given that most children experience different teachers every year who emphasize potentially different combinations of mastery and performance goals. Although we might expect children to change their goals to meet the expectations of a particular teacher, the goals parents emphasize may be a more stable and therefore more logical basis for children's personal goal orientations. However, this assumption warrants further examination. Parents may in fact change the emphasis they place on mastery or performance goals as children transition to higher grade levels or new schools, perhaps in response to the increasing pressure placed on their children to perform well on high-stakes tests and to satisfy vocational or college-preparatory requirements. The extent to which parents' emphases on mastery or performance goals change, and whether children's personal goals change in response, are interesting questions for future research.

As expected, children's personal goal orientations mediated the relation between their perceptions of goals emphasized in home and classroom contexts, and children's efficacy beliefs and use of adaptive and maladaptive coping strategies, with only one exception (projective coping strategies). Endorsement of mastery goals was positively related to self-efficacy and use of positive coping strategies, and negatively related to use of denial and

projective coping strategies. Mastery-oriented children were more likely to feel efficacious in mathematics, attempt to learn from mistakes and have optimism about future performances, and less likely to make external attributions for negative experience in math or to deny that something bad happened.

Conversely, children's endorsement of performance-approach goals was negatively related to their use of positive coping strategies, and positively related to their use of less adaptive coping strategies. Although endorsement of performance-approach goals was unrelated to efficacy, performance-oriented children were less likely than others to engage in positive and corrective strategies following difficulty in math, and more likely to make negative self-appraisals or worry that others will do so. They were also more likely to deny that something bad had happened, or to project blame for their difficulty onto the teacher.

Further analyses suggested a better model fit when we allowed for a direct effect between perceived teacher performance goals and children's use of projective coping strategies. Unlike other items assessing coping strategies, one item in the projective coping scale mentions the teacher specifically as a source of blame when something bad happens in math. Development of additional items that portray parents or other specific individuals as responsible for a child's struggles may cause the construct to relate differently to children's perceptions of parent and teacher goals.

4.1. Correlations and group differences

We noted a small but interesting difference in the relation between perceived parent mastery and performance goals relative to the relation between perceived teacher goals. Although perceptions of teacher mastery and performance goals are negatively related, this is not true for perceptions of parent goals, which are unrelated. Parents may be less likely than teachers to view mastery and performance goals as contradictory, emphasizing simultaneously the importance of learning for its own sake as well as the importance of high achievement and strong performance relative to others. However, this correlational difference also reflects the different ways in which we have measured perceptions of parent and teacher goal emphases.

We found very few differences in the perceptions and behaviors of boys and girls, and across children with different ethnic backgrounds. Although the overall *pattern* of relations did not vary by gender or ethnic background, mean group level differences suggest that parents and teachers may vary their emphasis on mastery or performance goals to a small degree based the gender or ethnic background of the child. Our analyses of the measurement model suggest that children with different cultural backgrounds vary slightly in their interpretation of item concepts, which may complicate interpretations regarding mean differences between groups. Qualitative examination of children's interpretation of items may yield better understanding of these findings.

Regarding perceptions of goals emphasized by parents and teachers, and personal goal orientation, boys perceive a stronger emphasis on performance goals from both teachers and parents, and tended to endorse personal performance goals more strongly, than do girls. This echoes prior research on personal goal orientation, in addition to research that indicates parents are more likely to attribute success in

mathematics to ability for boys, conveying a desire for boys to demonstrate ability, consistent with a performance goal (Eccles-Parsons et al., 1982; Jacobs, 1991). Boys were also more likely to endorse projective coping strategies. This is not surprising, given boys' perceptions and endorsement of performance goal orientations. However, we found no gender differences in children's perceptions of parents' or teachers' emphasis on mastery goals. Girls in this sample did not perceive a stronger emphasis on mastery, or the importance of developing understanding and learning from mistakes, than did boys. However, girls were more likely than boys to engage in non-coping behaviors (a small but significant effect). These findings suggest that boys and girls cope differently with academic difficulty, a difference that is evidently related to factors other than goal orientation, which explained only 18–26% of the variance in projective, denial, and non-coping strategies.

Whereas girls and boys differed in their perceptions of performance goal emphasis, Caucasian and Black children differed slightly in their perceptions of mastery goals emphasized in classroom contexts, but not home contexts, and endorsed personal mastery goals more strongly. However, this more mastery-focused classroom environment did not seem to translate into higher levels of efficacy. Unlike previous studies, we found no ethnic differences in children's efficacy beliefs in mathematics. However, the items we used to assess efficacy were subject-specific, whereas several studies that have documented a difference in efficacy have utilized more general items. Asking about a specific subject area, rather than school in general, may have allowed children to more accurately report their feelings of efficacy.

5. Conclusion

This study makes an important contribution to the research regarding the contextually situated nature of children's achievement goal orientations, efficacy beliefs and coping strategies. Most importantly, we demonstrated that the goals children perceive parents to emphasize, in addition to those they perceive teachers to emphasize in classrooms, are related to the goals children adopt, and indirectly to children's beliefs regarding the possibility of success in mathematics as well as the strategies they use to cope with academic difficulty. It is critical that we continue to impress upon teachers and parents the importance of maintaining a focus on learning and understanding. Likewise, we must help them realize the costs of focusing on a child's ability relative to others, particularly when children are engaged in difficult work. Our findings, in addition to prior research (e.g., Midgley et al., 2001), suggest that when children adopt performance goals, they are more likely to exhibit less adaptive patterns of behavior and affect when they encounter difficulty, reducing the likelihood that children will overcome misunderstandings and continue to learn.

Additional research is needed to more carefully examine how parents communicate achievement goals to children, and how children interpret their interactions with parents and teachers as emphasizing specific goals. In addition, we look forward to examining longitudinally how the goals parents emphasize change as children make transitions in schooling, and whether such changes affect longitudinal trends in children's goal orientations, self-efficacy beliefs, and coping strategies in mathematics.

Appendix A

Factor loadings and internal consistency for personal, perceived parent, and perceived teacher goal scales

Item	1	2	3	4	5	6
Personal mastery goal orientation ($\alpha = .86$)						
One of my goals in math is to learn as much as I can	.86					
Its important to me that I learn a lot of new math concepts this year	.84					
One of my goals is to master a lot of new math skills this year	.83					
Its important to me that I thoroughly understand my math work	.74					
Its important to me that I improve my math skills this year	.71					
Personal performance-approach goal orientation ($\alpha = .86$)						
One of my goals is to show others that I'm good at math	.81					
Its important to me that I look smart in math compared to others in my class	.80					
One of my goals in math is to look smart in comparison to the other students in my class	.79					
One of my goals is to show others that math is easy for me	.77					
Its important to me that other students in my class think I am good in math	.76					
Perceived parent mastery goal emphasis ($\alpha = .65$)						
My parents want me to understand math concepts, not just do the work			.70			
My parents want me to understand math problems, not just memorize how to do them			.70			
My parents would like me to do challenging math problems, even if I make mistakes			.64			
My parents think how hard I work in math is more important than the grades I get			.62			
My parents think mistakes are OK in math as long as I learn from them.			.55	-.40		
My parents want me to spend time thinking about math concepts			.36	.36		
Perceived parent performance goal emphasis ($\alpha = .70$)						
My parents don't like it when I make mistakes in math				.71		
My parents would like it if I could show that I'm better at math than other students in my class			.70			
My parents ask me how my work in math compares with the work of other students in my class				.56		
My parents would like me to show others that I am good at math	.28			.54		
My parents would be pleased if I could show that math is easy for me				.53		
Perceived teacher mastery goal emphasis ($\alpha = .74$)						
My teacher really wants us to enjoy learning new things in math					.77	
My teacher gives us time to really explore and understand new ideas in math					.74	
My teacher recognizes us for trying hard in math					.73	
My teacher thinks mistakes are okay in math as long as we are learning					.63	
My teacher wants us to understand our math work, not just memorize it					.53	
Perceived teacher performance goal emphasis ($\alpha = .84$)						
My teacher lets us know which students get the highest scores on a math test					.87	
My teacher points out those students who get good grades in math as an example to all of us					.83	
My teacher tells us how we compare in math to other students					.78	
My teacher lets us know if we do worse in math than most of the other students in class					.68	
My teacher makes it obvious when certain students are not doing well on their math work					.67	

Note. Only factor loadings $>.25$ are reported.

Additional constructs

Academic self-efficacy in mathematics ($\alpha = .85$)

I'm certain I can master the skills taught in math this year.

I can do even the hardest work in math if I try.

I can do almost all the work in math if I don't give up.

Even if the work in math is hard, I can learn it.

I'm certain I can figure out how to do even the most difficult math work.

Academic coping inventory

Stem: If something bad happened to me during math, such as doing poorly on a test or not being able to answer a question in class...

Positive coping ($\alpha = .75$)

... I would try to figure out what I did wrong so it wouldn't happen again.

... I would try to see what I did wrong.

... I would tell myself that I'll do better next time.

Projective coping ($\alpha = .78$)

... I would say it was the teacher's fault.

... I would say that the teacher didn't cover the things on the test.

... I would get angry at the teacher.

Denial coping ($\alpha = .75$)

... I would tell myself it didn't matter.

... I would say it wasn't important.

... I would say I didn't care about it.

Non-coping ($\alpha = .83$)

... I would feel really terrible.

... I would worry that other students would think I'm dumb.

... I would feel really stupid.

... I would get really mad at myself.

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